PATENT ABSTRACTS OF JAPAN

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(54) IMAGE FORMING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To detect various cassette conditions
such as a size of paper contained in a cassette, if paper exists or
not, if a cassette is installed or not, and if a cover for releasing jam
is opened or not by a less number of signal lines, and hold
information related to the other conditions while one condition is
being detected by one signal line.
SOLUTION: Signals from cassette condition detection circuits
91...9n are respectively inputted by one signal line to an A/D input
port of an MPU 8. The MPU 8 discriminates if paper exists or not, if
a cassette exists or not, and a size of paper based on a voltage of
each signal line. When the cassette is installed, the MPU 8
memorizes the size of paper in a RAM 17. In the case where the
MPU 8 discriminates that there is no paper, the MPU 8 reads data
of the paper size from the RAM 17, and it displays that paper
needs be replenished with the paper size in an LCD 21.
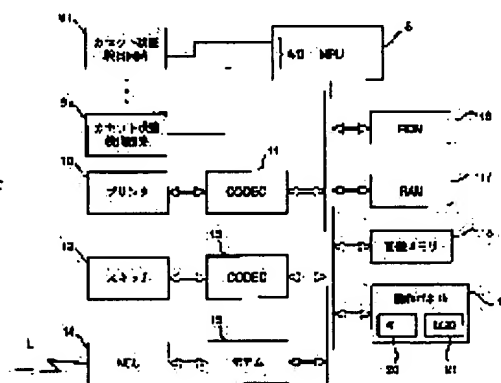
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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The image-formation equipment which characterizes by to have had the condition detection means are image-formation equipment which forms an image in the record medium held in a cassette, and detect the condition of a cassette, the output means change the analog voltage of an output signal based on the detection result of a condition detection means, the discernment means identify the condition of a cassette based on the output signal of an output means, and the condition storage means memorize the cassette condition identified with a discernment means.
[Claim 2] The condition of the above-mentioned cassette is image formation equipment according to claim 1 with which the above-mentioned condition storage means memorizes the size of the record medium identified with the discernment means when the above-mentioned discernment means identifies having been equipped with the cassette including the existence of wearing of a cassette, and the size of the record medium held in the cassette.
[Claim 3] The condition of the above-mentioned cassette is image formation equipment [equipped with an information means to report the size of the record medium memorized by the above-mentioned condition storage means when it identifies that the above-mentioned discernment means of a record medium was lost, while the existence of the record medium further held in the cassette is included] according to claim 2.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the image formation equipment which can detect the condition of a cassette with the signal line of a small number, if it says to the record medium held in the cassette in detail about the image formation equipment which forms an image.
[0002]
[Description of the Prior Art] In a copy machine, a printer, and facsimile apparatus, 1 or the thing which it had is used in the cassette which holds the form with which magnitude differs. With these equipments, there are some which are using as another object the unit which contains a body and a cassette so that it can equip with the required number of cassettes according to a user's hope.
[0003] In the unit (henceforth an option cassette) of the cassette of such an another object, the form held in the cassette besides a cassette is taken up, and the drive for conveying to a body side is formed. The driving force of these drives may be mechanically supplied from a body, and may be equipped with a motor in an option cassette.
[0004] Moreover, the sensor which detects the existence of wearing of a cassette, the existence of the form in a cassette, and the size of the form held in a cassette is formed in these option cassette. The information detected by these sensors is transmitted to the control section of a body, and is used for control of the whole image formation equipment.
[0005] Furthermore, when the form taken up from the cassette produces a jam, covering which can be opened and closed freely may be prepared in an option cassette so that it can be canceled. Since it becomes impossible to convey a form on a body when this covering is open, it is necessary to also tell the switching condition of covering to the control section of a body. If it recognizes that covering is open, the control section of a body will carry out an error message, and will be made not to perform image formation actuation.
[0006]
[Problem(s) to be Solved by the Invention] With the image formation equipment using the conventional option cassette, in order to transmit the information on cassette conditions, such as existence of wearing of a cassette, existence of the form of a cassette, size of the form in a cassette, and a switching condition of covering, to a body, the output of each sensor was connected to the control section of a direct body. For this reason, there was a trouble that the signal lines for connecting an option cassette with a body increased in number, and many ports were needed for a body control section. This trouble will become remarkable especially, if the number of option cassettes increases.
[0007] There is a method of tying a body and an option cassette with a daisy chain format with a serial data bus as an option which ties a body and an option cassette. by this approach, although there are few signal lines itself, an option cassette is alike, respectively and the microcomputer for control is carried -- required -- certain ** Naturally the program of these microcomputers also needed to be created and there was a trouble that components cost and a man day started.
[0008] This invention aims at offer of the image formation equipment which can tell a cassette condition to the control section of a body with few signal lines, without being made in view of the above and raising cost and a man day.
[0009]
[Means for Solving the Problem] A condition detection means for invention of claim 1 to be image formation

equipment which forms an image in the record medium held in the cassette, and to detect the condition of a cassette in order to solve the above-mentioned technical problem, It is characterized by having an output means to change the analog voltage of an output signal based on the detection result of a condition detection means, a discernment means to identify the condition of a cassette based on the output signal of an output means, and a condition storage means to memorize the cassette condition identified with the discernment means.

[0010] In invention of claim 1, since the condition of various kinds of cassettes is told to the control section of a body as an analog signal of an output signal, information can be told with few signal lines. And complicated circuitry, such as a microcomputer for serial data transmission, is not required of a cassette side.

[0011] In this case, when there are two or more cassette conditions detected about one cassette and one cassette condition is detected, the above-mentioned discernment means cannot be known about other conditions, but trouble may be caused to control of equipment. Then, even when the cassette condition identified with the discernment means is memorized for a condition storage means and one condition is detected, it enables it to get to know other cassette conditions in invention of claim 1.

[0012] When the above-mentioned discernment means identifies invention of claim 2 as having been equipped with the cassette including the existence of wearing of a cassette, and the size of a record medium held in the cassette in invention of claim 1, as for the condition of a cassette, the above-mentioned condition storage means memorizes the size of the record medium identified with the discernment means.

[0013] When equipped with a cassette, the size of the record medium held in the cassette is memorized, and even when the output of an output means shows other conditions, it enables it to get to know the size of the record medium in a cassette in invention of claim 2.

[0014] In invention of claim 2, invention of claim 3 is equipped with an information means to report the size of the record medium memorized by the above-mentioned condition storage means, when it identifies that the discernment means of a record medium was lost, while the condition of a cassette contains the existence of the record medium further held in the cassette.

[0015] In invention of claim 3, even when it is shown that the record medium with which the output in an output means was held in the cassette was lost, the size of the record medium is memorized by the condition storage means. Therefore, an information means reports with the size that the recording paper was exhausted, and the user can be made to make supply of a record medium easy.

[0016]

[Embodiment of the Invention] The gestalt of 1 operation of this invention is explained below, referring to a drawing. The gestalt of this operation shows the example which applied this invention to facsimile apparatus. Of course, this invention is applicable also to a copy machine or a printer. First, it explains, referring to drawing 4 about the rough circuitry of facsimile apparatus.

[0017] A microprocessor unit (it is called Following MPU) 8 controls the whole facsimile apparatus. Two or more analog-to-digital (A/D) input port is established in this MPU8, and it is the below-mentioned cassette condition detector 91.. 9n It connects. In addition, one A/D input port is chosen as two or more cassette condition detectors by a multiplexer etc., and you may make it connect. Moreover, you may make it input the digital data from this A/D converter into MPU through a data bus using an A/D converter different from MPU.

[0018] The read-only memory (ROM) 16 has memorized the control program of MPU8, and fixed data, such as a font. When it comes to the working area of MPU8, both the random access memory (RAM) 17 memorizes the data, abbreviated dialing data, and communication management data of a paper size. The image data which the image memory 18 was received or was read with the scanner is memorized in the state of proper compression. As for the control panel 19, the key 20 and liquid crystal display (LCD) 21 for various actuation are prepared. The operating state of time of day, a number to be dialed, and facsimile apparatus etc. is displayed on LCD21.

[0019] A sign and a decoder (CODEC) 11 decode the compressed data which were read from the image memory 18, and gives them to a printer 10. A printer 10 is printed on the form which does not illustrate the image data from CODEC11. One of recording methods, such as an electrophotography method, a hot printing method, thermal recording, and an ink jet method, can be used for a printer 10.

[0020] A scanner 12 reads the image on a manuscript and outputs it to CODEC13 as binary image data. CODEC13 compresses image data binary [from a scanner 12]. MPU8 stores the compressed image data in an image memory 18. In addition, a charge-coupled device (CCD) and a contact type image sensor are applied to a scanner 12.

[0021] A modem 15 is connected to the telephone line L through the network control circuit (NCU) 14. A modem 15 modulates the image data read from the image memory 8, and sends it out to the telephone line L. Moreover, a modem 15 restores to the image data which received from the telephone line L, and an image memory 18 is made to memorize it. NCU14 controls connection between the telephone line L and a modem 15, and has functions, such as detection of a call signal, and generating of a dial pulse.

[0022] Next, detection of a cassette condition is explained below, referring to drawing 1 . 1 is a cassette and is inserted in the option cassette which is not illustrated in the direction of arrow-head I. In a cassette 1, Form P is contained, where a laminating is carried out.

[0023] The paper-size detection pin 2 is attached in side-face 1a of a cassette 1 free [attachment and detachment]. The paper-size detection pin 2 inserts projection 2a, 2b, and 2c in the holes 3a, 3b, and 3c formed in side-face 1a, and is attached. According to the size of the form which an upper case, the middle, and the three lower berths are formed, and holds the installation location of the paper-size detection pin 2, 1-3 paper-size detection pins 2 are attached in a position.

[0024] The switch substrate 4 is formed along with cassette side-face 1a in practice. In drawing 1 , in order to make an understanding easy, the switch substrate 4 is drawn on the location detached from side-face 1a. On the switch substrate 4, the baton switches SW1, SW2, and SW3 are mounted. Each baton switches SW1, SW2, and SW3 support each of the upper case of the installation location of the paper-size detection pin 2, the middle, and the lower berth. For example, if the paper-size detection pin 2 is attached in the middle, the baton switch SW2 will be pushed and it will become ON.

[0025] The form-less detection sensor 5 is formed in the cassette 1 upper part. The form-less detection sensor 5 consists of a filler 6 and phot interrupter PI. The filler 6 is in contact with the top face of the form P with which the laminating of the point 6a was carried out. If Form P is exhausted, since point 6a will insert in the slit 7 of a form push raising plate (not shown), a filler 6 rotates to the counterclockwise rotation in drawing 1 focusing on 6b. Then, back end section 6c of a filler 6 crosses phot interrupter PI, and it is detected that the form was exhausted.

[0026] Drawing 2 shows the configuration of the cassette condition detector 9. The above-mentioned baton switches SW1, SW2, and SW3 are connected to the analog switch AS. In addition, VO Supply voltage is shown and it is R7, R8, and R9. It is the pull-up resistor of the baton switches SW1, SW2, and SW3, respectively.

[0027] Based on ON/OFF of the baton switches SW1, SW2, and SW3, an analog switch AS chooses one of the X7 from an input X0, and outputs it from OUT. X7 is connected to the resistance ladder RA from the input X0 of an analog switch AS. It consists of nine resistance R11, R12, R13, R14, R15, R16, R17, R18, and R19, and the resistance ladder RA is supply voltage VO. It is dividing into eight.

[0028] The output OUT of an analog switch AS is drawn through diode D3 at the A point of a signal line S. On the other hand, the signal from the photo transistor of phot interrupter PI is diode D2. It minds and is led at an A point. In this signal, it is supply voltage VO at a B point. Resistance R5 and R6 The electrical potential difference VNP (refer to drawing 3) pressured partially is applied further. In addition, R4 It is the protective resistance of the light emitting diode of phot interrupter PI.

[0029] CO is a covering switch for detecting opening of covering which is not illustrated. The end of this covering switch CO is grounded and an end is already added to a signal line S in a B point through diode D1. It is supply voltage VO at B' point also to the signal from the covering switch CO. Resistance R2 and R3 The electrical potential difference VCO (refer to drawing 3) pressured partially is applied.

[0030] The signal line S is connected to the analog-to-digital (A/D) input port of MPU8 by the side of a body. MPU8 changes the signal of A/D input port into digital value, and judges the condition of an option cassette based on the digital value. Resistance R1 When there is no option cassette itself, it is prepared in order to make A/D input port into an electrical potential difference 0.

[0031] Next, actuation of the cassette condition detector 9 is explained, referring to drawing 2 and drawing 3 . First, since the electrical potential difference of the A/D input port of MPU8 is set to 0 when not equipped with the option cassette itself, MPU8 can judge ** which is not equipped with the option cassette.

[0032] Since the covering switch CO is open when covering opens although equipped with the option cassette, the potential of a B point is supply voltage VO. Resistance R2 and R3 It becomes the electrical potential difference VCO pressured partially. This electrical potential difference VCO is made larger than an electrical potential difference VNP and the electrical potential differences VNC, VA4, VA5, VB4, VB5, VLT, VLG, and

VF4 mentioned later. Therefore, when covering is open, it can be judged that covering is opening MPU8 preferentially.

[0033] On the other hand, when covering has closed, the covering switch CO serves as ON and the potential of B' point is set to 0. However, diode D1 Since it is, the electrical potential difference of a B point is not set to 0, and MPU8 does not judge accidentally that he has no option cassette.

[0034] the case where it is not equipped with the cassette 1 -- any of the baton switches SW1, SW2, and SW3 -- although -- it is off. Therefore, an analog switch AS chooses an input X7, chooses the highest electrical potential difference VNC within the resistance ladder RA, and leads it to an output OUT. This electrical potential difference VNC is made higher than the electrical potential difference VNP in case there is no form. the case where covering has closed -- any of the baton switches SW1, SW2, and SW3 -- although -- if it has become off, MPU8 will judge that it is not equipped with the cassette 1.

[0035] When a form is exhausted, phot interrupter PI is shaded by filler back end section 6c. Consequently, the electrical potential difference of A' point is supply voltage VO. Resistance R5 and R6 It becomes the electrical potential difference VNP by which the partial pressure was carried out. Therefore, an output OUT serves as VNP and MPU8 can judge that the form was exhausted. In addition, except for the condition of not being equipped with the cassette, even if it is in the condition that the form of which size is held, the output OUT of an analog switch AS is set up so that it may become lower than an electrical potential difference VNP.

[0036] Moreover, diode D3 Since it is, a current does not flow from an A point to an output OUT, and the electrical potential difference of an A point is not changed from VNP. On the other hand, since phot interrupter PI is in a light transmission condition when there is a form, a photo transistor turns on and the electrical potential difference of A' point is set to 0. However, diode D2 Since it is, even if A' point becomes 0 potential, the electrical potential difference of an A point is not affected.

[0037] He makes the electrical potential difference VNC without a cassette higher than the electrical potential difference VNP without a form, namely, is trying for a form-less twist to also judge those without a cassette preferentially with the gestalt of this operation. However, those without a form may be judged more preferentially without a cassette on account of the message which control of MPU8 arranges for example, displays.

[0038] When covering is closed, and there is a form and it is equipped with the cassette, the output OUT of an analog switch AS takes either showing the size A4 length of the form held in the cassette, A5 width, B4 length, B5 width, a letter, legal one, and F4 of the electrical potential differences VA4, VA5, VB4, VB5, VLT, VLG, and VF4. The relation of VA4>VA5>VB4>VB5>VLT>VLG>VF 4> 0 among these electrical potential differences is. Of course, the size of a form or the ranking of an electrical potential difference to be used are not limited to this.

[0039] For example, suppose that the form of B4 length is held in the cassette 1. In this case, the paper-size detection pin 2 is attached in the installation location of an upper case and the middle at cassette side-face 1a. In this case, the baton switches SW1 and SW2 are turned on, and that of SW3 are off. An analog switch AS chooses an input X4, and the electrical potential difference 4 between R14 and R15, i.e., VB, appears in an output OUT.

[0040] Although the electrical potential difference of A'point and B' point is 0 as mentioned above at this time, they are diode D2 and D1. VB4 is not changed according to an operation. MPU8 reads this electrical potential difference VB 4 in A/D input port, and judges the size of the form held in the cassette.

[0041] Next, it explains below, referring to drawing 5 about actuation of discernment of the cassette condition of MPU8. The routine of cassette condition detection is started with proper means, such as interruption. Although drawing 5 explains the actuation about one cassette condition detector 9, processing same about other cassette condition detectors is carried out. If the routine of cassette condition detection starts, MPU8 will read A/D input port first, and will acquire the digitized electrical-potential-difference value (step 1 (it is called Following ST)).

[0042] It is judged that covering is opening MPU8 when the digitized electrical-potential-difference value is compared with VCO and coincidence or a difference has this in the predetermined range (ST2). When this decision is YES, MPU8 branches to ST3 and displays the purport which covering is opening to LCD21. When decision of ST2 is NO, MPU8 branches to decision of ST4.

[0043] In ST4, when the digitized electrical-potential-difference value is compared with VNC and coincidence

or a difference has this in the predetermined range, it is judged that it is equipped with the cassette. When it is judged that it is not equipped with the cassette, MPU8 branches to ST5 and displays the purport of "please close a cassette" on LCD21.

[0044] When it is judged that it is equipped with the cassette by decision of ST4, MPU8 branches to ST6 and judges whether as compared with VNP, there is any form about the digitized electrical-potential-difference value. When this decision is YES, MPU8 branches to ST7 and indicates the purport of "please supply a form" LCD21 with the size of the form read from RAM17. In addition, when the paper size is not memorized by RAM17, you may make it display only the purport of "please supply a form" immediately after switching on a power source etc.

[0045] When decision of ST6 is NO, MPU8 branches to ST8 and identifies the size of a form for the digitized electrical-potential-difference value as compared with VA4, VA5, VB4, VB5, VLT, VLG, and VF4. Furthermore at ST9, MPU8 is [0046] which memorizes the identified paper size to RAM17. In addition, although the size of the form in a cassette is memorized, it is not limited to this and you may make it memorize opening of covering, the existence of a form, the existence of wearing of a cassette, etc. with the gestalt of this operation. Moreover, although it is used with the gestalt of this operation for the display of an error of the memorized cassette condition, the memorized cassette condition may be used for other control, and can be changed suitably.

[0047]
[Effect of the Invention] A condition detection means by which invention of claim 1 detects the condition of a cassette as explained above, An output means to change the analog voltage of an output signal based on the detection result of a condition detection means, A discernment means to identify the condition of a cassette based on the output signal of an output means, It is characterized by having a condition storage means to memorize the cassette condition identified with the discernment means, and since the condition of various kinds of cassettes is told to the control section of a body as an analog signal of an output signal, information can be told with few signal lines.

[0048] And complicated circuitry, such as a microcomputer for serial data transmission, is not required of a cassette side. Moreover, even when one cassette condition is detected, it has the advantage which can know other cassette conditions.

[0049] When, as for invention of claim 2, the above-mentioned discernment means identifies the condition of a cassette as having been equipped with the cassette including the existence of wearing of a cassette, and the size of a record medium held in the cassette, Since the size of the record medium from which the above-mentioned condition storage means was discriminated with the discernment means is memorized, even when the output of an output means shows other conditions, it has the advantage which can know the size of the record medium in a cassette.

[0050] While the condition of a cassette contains the existence of the record medium further held in the cassette in invention of claim 2, invention of claim 3 When it identifies that the discernment means of a record medium was lost, it has an information means to report the size of the record medium memorized by the above-mentioned condition storage means. An information means reports with the size that the recording paper was exhausted, and the user has the advantage which can make supply of a record medium easy.
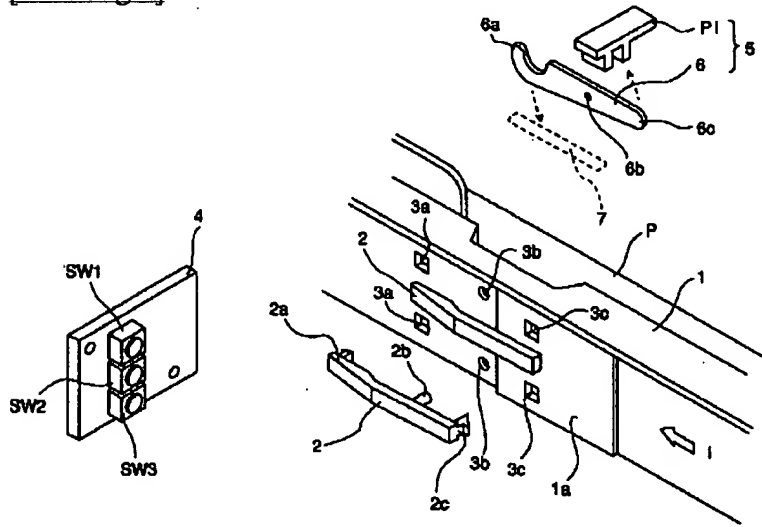
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* NOTICES *

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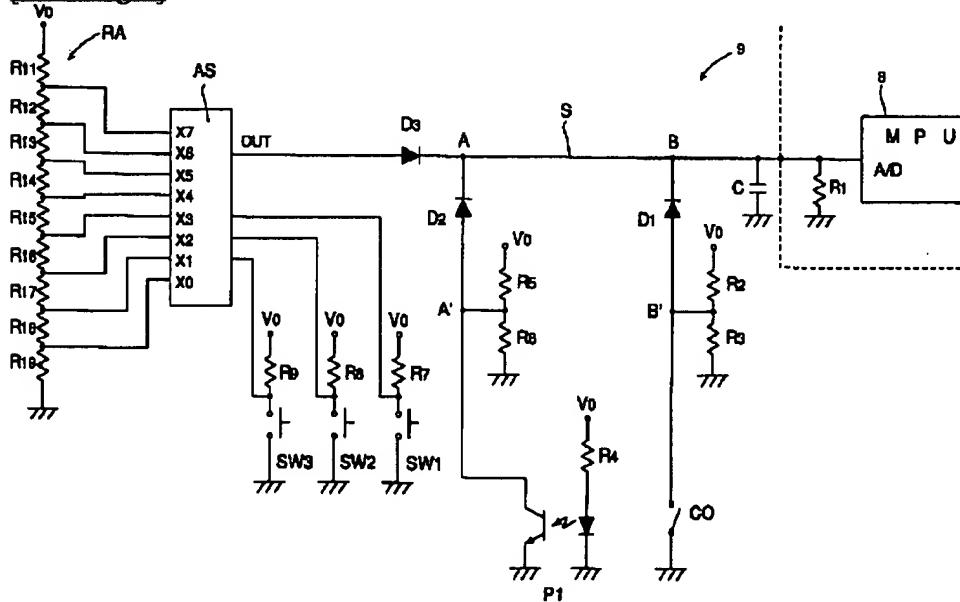**damages caused by the use of this translation.**

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.
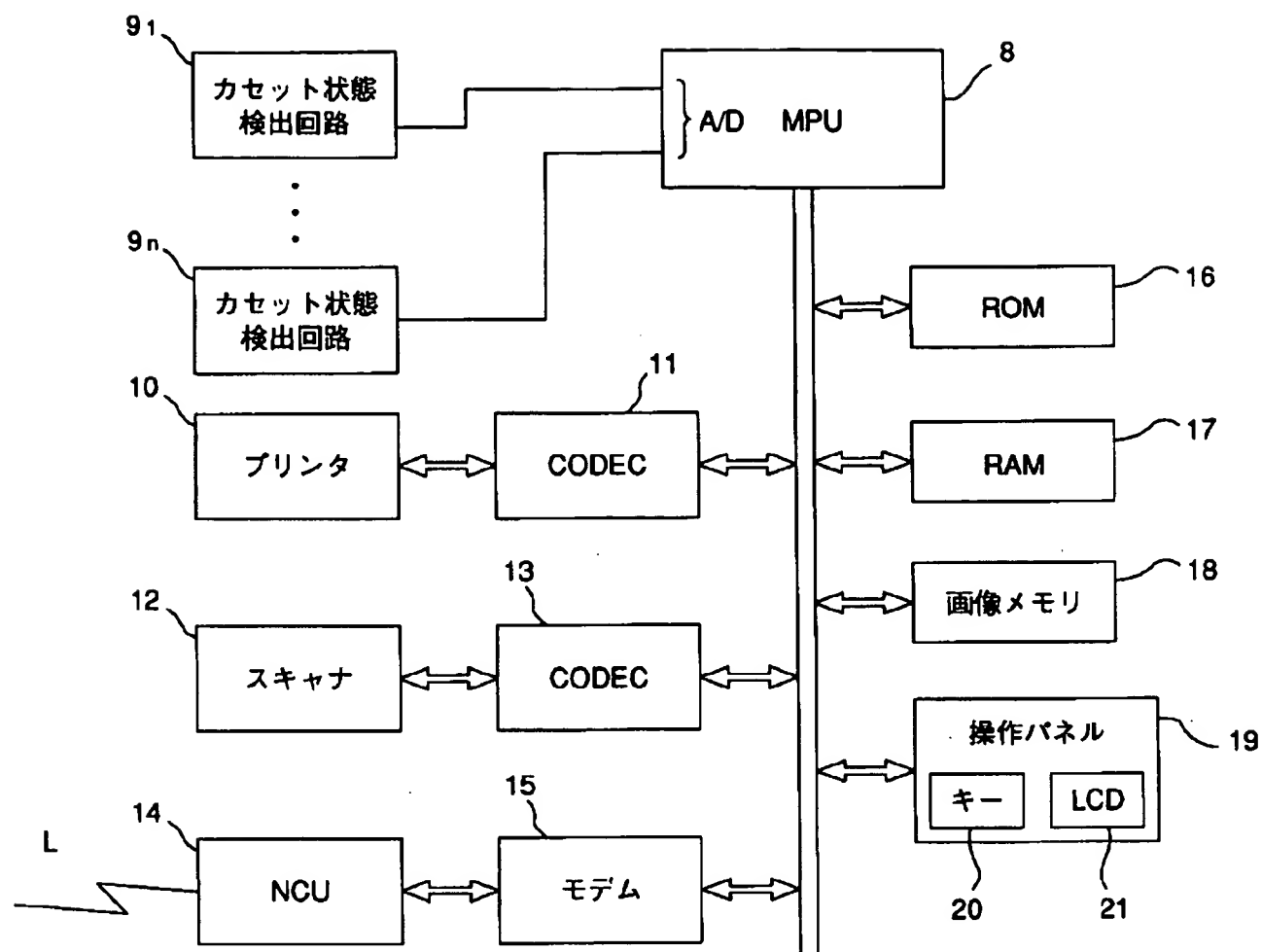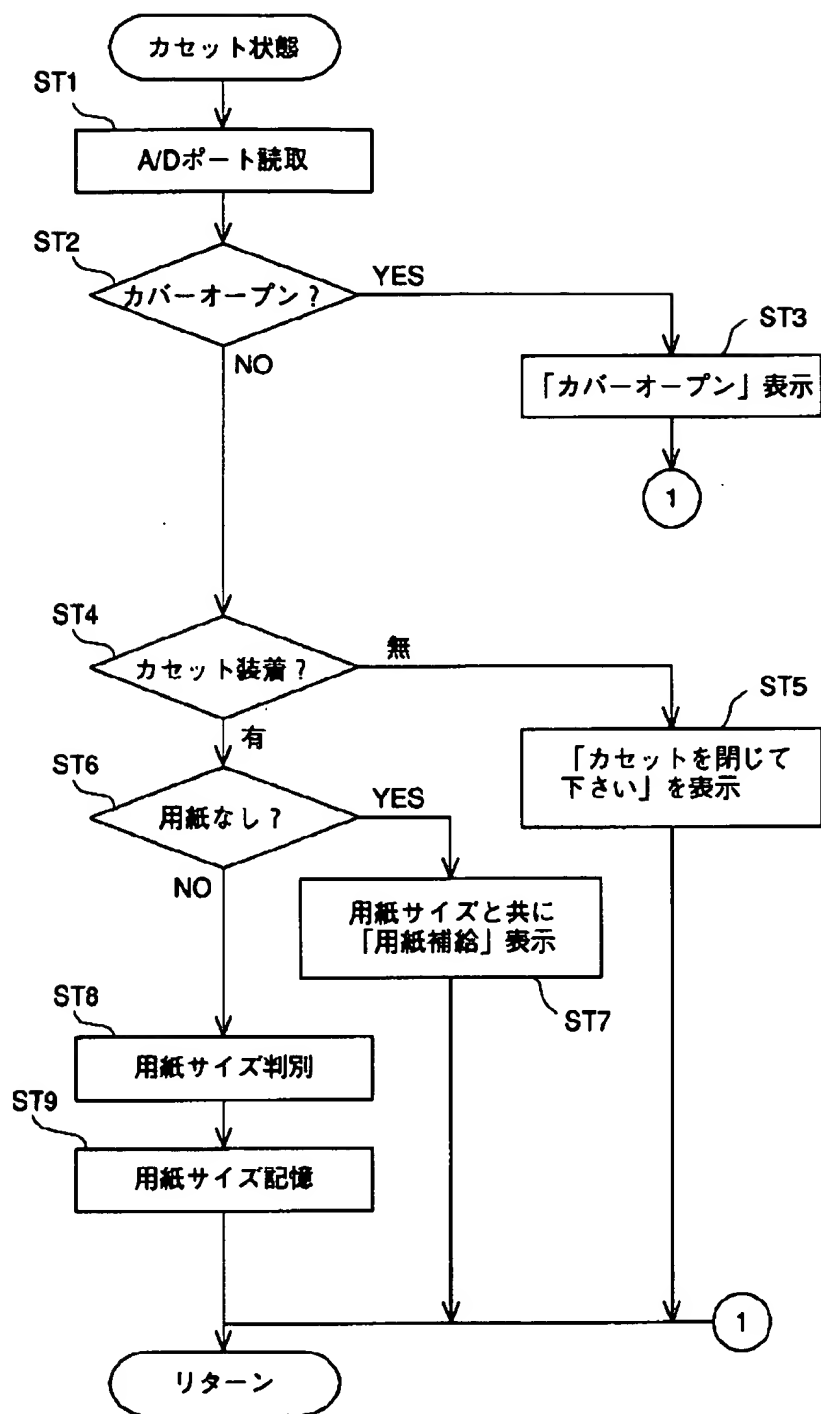

DRAWINGS

[Drawing 1]

[Drawing 2]

[Drawing 3]

状態	Co	PC	SW1	SW2	SW3	電圧
オプション無し	×	×	×	×	×	0
カバーオープン	OFF	×	×	×	×	$V_{co}\,(=V_o \cdot R_3/(R_2+R_3))$
記録紙無し	ON	OFF	×	×	×	$V_{NP}\,(=V_o \cdot R_6/(R_5+R_6))$
カセット無し	ON	ON	OFF	OFF	OFF	$V_{NC}\,(=V_o \cdot (R_{12}+R_{13}+R_{14}+R_{15}+R_{16}+R_{17}+R_{18}+R_{19})/R_{10})$
A4縦	ON	ON	ON	OFF	OFF	$V_{A4}\,(=V_o \cdot (R_{13}+R_{14}+R_{15}+R_{16}+R_{17}+R_{18}+R_{19})/R_{10})$
A5横	ON	ON	OFF	ON	OFF	$V_{A5}\,(=V_o \cdot (R_{14}+R_{15}+R_{16}+R_{17}+R_{18}+R_{19})/R_{10})$
B4縦	ON	ON	ON	ON	OFF	$V_{B4}\,(=V_o \cdot (R_{15}+R_{16}+R_{17}+R_{18}+R_{19})/R_{10})$
B5横	ON	ON	OFF	OFF	ON	$V_{B5}\,(=V_o \cdot (R_{16}+R_{17}+R_{18}+R_{19})/R_{10})$
レター	ON	ON	ON	OFF	ON	$V_{LT}\,(=V_o \cdot (R_{17}+R_{18}+R_{19})/R_{10})$
リーガル	ON	ON	OFF	ON	ON	$V_{LG}\,(=V_o \cdot (R_{18}+R_{19})/R_{10})$
F4	ON	ON	ON	ON	ON	$V_{F4}\,(=V_o \cdot R_{19}/R_{10})$

注) $R_{10}=R_{11}+R_{12}+R_{13}+R_{14}+R_{15}+R_{16}+R_{17}+R_{18}+R_{19}$

[Drawing 4]

[Drawing 5]

ST1

カセット状態

A/Dポート読取

ST2

カバーオープン？ —YES→ 「カバーオープン」表示 ST3 → ①

NO

ST4

カセット装着？ —無→ 「カセットを閉じて下さい」を表示 ST5

有

ST6

用紙なし？ —YES→ 用紙サイズと共に「用紙補給」表示 ST7

NO

ST8

用紙サイズ判別

ST9

用紙サイズ記憶

①

リターン

[Translation done.]